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to incandescence. In the Welsbach light, now on exhibition in New York, the incandescent substance is used in an extremely thin or attenuated form, requiring the minimum heat to produce the maximum of light. The principle of the invention will be understood when it is described as a hood or mantle of finely divided but perfectly coherent refractory oxides of lanthanum, zirconium, and yttrium round the flame of a Bunsen burner. The lamp has given satisfactory results so far.

— We learn from the *Engineering and Mining Journal* that the Alliance Aluminium Company has been formed in London, England, with a capital of £500,000, for the purpose of manufacturing aluminium, sodium, and potassium. The company owns the English, German, French, and Belgian patents of Professor Netto for the reduction of aluminium from its compounds, and for the manufacture of sodium and potassium; the processes of Mr. Cunningham for the reduction of the above metals; a process for the manufacture of artificial cryolite by the regeneration of its slags, provisionally protected by the inventor, Mr. Forster, Lonsome Chemical Works, Streatham; a process invented by Professor Netto and Dr. Saloman, of Essen, Germany, by which this metal can be raised to the highest standards of purity on a commercial scale. Exhaustive experiments have been made at the works of Krupp at Essen to test the practical value of the processes, and it is stated that he has the means of making the metal in tons. Instead of beads or marbles, solid chunks of the purest aluminium known, weighing from five pounds to one hundred pounds (according to the size of the converter), are deposited at every fusion of the ingredients, chief among which are sodium and cryolite. The company has a contract with the owners of the cryolite-mines in Greenland to supply it with practically the entire output. It is stated that the patents of the company enable it to manufacture it at considerably less than one shilling per pound.

— An interesting fact in the history of the movement for industrial training in the public schools of Washington is its connection with Cooper Union, that unique institution of which New York is so justly proud. As already stated in *Science*, industrial drawing, including moulding in clay, and construction in card-board, etc., has long been a feature of the Washington schools. The supervisor of drawing, Mrs. S. E. W. Fuller, who for fifteen years has guided the work, was trained in the Cooper Union in those early days when, with an enthusiasm and thoroughness not excelled by later institutions and a wise prevision of coming demands, it brought art and industry into their proper relation as means and purposes of education.

LETTERS TO THE EDITOR.

* * * Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

An Unusual Auroral Bow.

I WAS much interested in Mr. D. S. Kellicott's communication in your issue of June 1, describing a peculiar form of northern lights; particularly so, as it was my fortune to witness a similar phenomenon in 1881. On July 2 of that year, the day on which President Garfield was shot, at about 9.20 in the evening, faint streaks of light were observed on the northern horizon. I then observed a streak of cloud-like light ascending at about the east-south-east horizon. Looking around, I saw a similar streak at an opposite point. In a short time these streaks blended into one in the zenith, forming an arch overhead. There was a bend or crook in this arch; just at what point I do not remember, as I made no note of it, but I think at or near the middle. Presently the streak began to grow narrower; then it changed and broadened again, until it became wider than it was at first; then the southern edge resolved itself into parallel bars at right angles with the arch; shortly after, the northern edge resolved itself into similar bars, which moved rapidly towards the west; presently the bars at the southern edge of the arch either vanished or blended with the others, and they all glided swiftly by towards the west; the bars gradually became fewer and fewer, until they could be seen only here and there

gliding along; and at last the whole arch faded entirely away. During all this time the lights in the north had been shining, and when I retired for the night they were still to be seen.

I have copied this description from notes which I took at the time. I have seen other interesting auroras, but never have seen the arch overhead since.

FRANCIS H. ALLEN.

West Roxbury, Mass., June 13.

Concerning the Montville Serpentine.

THE statement made by your correspondent in your issue of June 15, regarding work done by me on the Montville, N.J., serpentine, induces me to add a few additional particulars on the subject. This I am the more inclined to do, since the paper giving the full results of my work is as yet unpublished, but is awaiting its turn in the Government Printing-Office.

The origin of serpentinous rocks, by a process of metasomatism, from the various members of the pyroxene group, is a matter by no means new to petrographers in general, and has been noted by Dana in the limestone-beds of Westchester County, N.Y., as well as by Emmons and Cross in those of the Leadville region. None of the cases, however, can compare in point of beauty with that at Montville. Here, in a coarsely crystalline, highly magnesian limestone, were originally embedded numerous large and small spheroidal and lenticular masses of a gray or pure white monoclinic pyroxene approaching diopside in composition. These, through a process of metasomatism commencing on the outer surface, have become converted wholly or in part into a very pure, though highly hydrated, translucent green and light amber-yellow serpentine. In the process of quarrying the limestone for flux, these nodules are thrown out; and from the quarry dump have been gathered samples showing most beautifully every stage of the change, from that in which the serpentine exists as merely a thin coating, to that in which all traces of the diopside have disappeared, and a solid block of compact serpentine alone remains. The nodules vary in size from the fraction of an inch to two or more feet in diameter. I have as yet, however, never seen blocks of the serpentine more than six or eight inches in greatest diameter. The process of change must have been exceedingly slow and gradual, as the line of demarcation is very sharp; so sharp, indeed, that at first glance such an origin as I have attributed appears impossible. On exposure to the weather, the serpentinous coating undergoes a shrinkage, and breaks away from the unchanged nodule almost as clean as the burr from a chestnut. Nodules in the museum collections, which have been freed from their serpentinous coating, have the appearance of some easily soluble substance, like limestone, that has been suspended freely in a dilute acid until all its angles and irregularities of surface have disappeared.

In my paper which is shortly to appear in the Proceedings of the United States National Museum are plates showing the nodules and the transition stages from diopside to serpentine, as shown in thin sections under the microscope. I have gone into considerable detail in my description, not merely on account of the beauty of the resultant serpentine, but because this is an unusually fine illustration of the process of metasomatism. The beautifully slickensided surfaces, and other indications of the expansive force generated during the process, are also very suggestive.

The readiness with which samples can be procured which show in a single small specimen all stages, from perfectly fresh and unchanged diopside to beautiful compact serpentine, makes the material particularly valuable to teachers. The small size of the serpentine blocks obtainable, together with the invariably fractured condition of the mineral, renders it of practically no importance as an ornamental stone.

GEORGE P. MERRILL.

U.S. Nat. Mus., Washington, June 16.

Queries.

33. DIPHTHERIA CARRIED BY TURKEYS. — Referring to the paragraph 'Diphtheria carried by Turkeys,' in *Science* for May 11, I beg to inquire if the disease among barnyard fowls known as 'roup' has been investigated as a germ disease, and its relations with other animal orders (if it have any) made out or sought.

J. T. W.